## **CLAIMS**

What is claimed is:

- 1 1. A method comprising:
- 2 receiving packet data;
- 3 concatenating the packet data into a Time Division Multiplexing (TDM)
- 4 Synchronous Optical Network (SONET) signal, wherein the concatenation can be across
- 5 any locations within the TDM SONET signal and wherein a size of the concatenation can
- 6 be in increments of single SONET frames; and
- 7 transmitting the TDM SONET signal having the concatenated packet data.
- 1 2. The method of claim 1, wherein the packet data is concatenated within locations
- 2 in the TDM SONET signal not occupied by TDM data traffic.
- 1 3. The method of claim 1, wherein the transmitting of the TDM SONET signal is
- between two network elements in a network ring.
- 1 4. A method comprising:
- 2 receiving a number of packets within a first Time Division Multiplexing (TDM)
- 3 Synchronous Optical Network (SONET) signal having a number of SONET frames,
- wherein the packets are concatenated across any of the number of SONET frames within
- 5 the first TDM SONET signal, such that a size of the concatenation can be in increments
- 6 of single SONET frames;
- y upon determining that the number of packets are being transmitted to a first
- 8 location that cannot extract the number of packets from any of the number of SONET
- 9 frames in the first TDM SONET signal, performing the following:
- extracting the number of packets from the first TDM SONET signal;

1	filling a number of SONET frames in a second TDM SONET signal with
12	transmission data that includes the number of packets, wherein the filling is equally
13	interleaved across the number of SONET frames in the second TDM SONET signal and;
14	transmitting the second TDM SONET signal to the first location; and
15	upon determining that the number of packets are being transmitted to a second
16	location that can extract the number of packets from any of the number of SONET frames
17	in the first TDM SONET signal, transmitting the first TDM SONET signal to the second
18	location.

- 5. The method of claim 4, wherein the first location is a network element that is external to a network ring.
- 1 6. The method of claim 4, wherein the second location is a network element that is 2 internal to a network ring.
- 1 7. A method comprising:
- 2 receiving portions of packets;
- 3 placing the portions of packets into buffers;
- determining packet boundaries among the portions of packets in the buffers,
- 5 wherein the determining of the packet boundaries locates a number of packets;
- 6 concatenating the number of packets into a Time Division Multiplexing (TDM)
- 7 Synchronous Optical Network (SONET) signal, wherein the concatenation can be across
- 8 any locations within the TDM SONET signal and wherein a size of the concatenation can
- 9 be in increments of single SONET frames; and
- transmitting the TDM SONET signal having the number of concatenated packets.

- 1 8. The method of claim 7, wherein the number of packets are concatenated within
- 2 locations in the TDM SONET signal not occupied by TDM data traffic.
- 1 9. The method of claim 7, wherein the transmitting of the TDM SONET signal is
- 2 between two network elements in a network ring.
- 1 10. A network element of a network ring comprising:
- 2 physical connection circuitry having a number of buffers, the number of buffers to
- hold packet data received from a different network element that is external to the network
- 4 ring, the physical connection circuitry to determine packet boundaries from the packet
- 5 data; and
- 6 packet processing circuitry coupled to the physical connection circuitry, the
- 7 packet processing circuitry to receive the packets from the physical connection circuitry
- 8 and to concatenate the packets into any location with a Time Division Multiplexing
- 9 (TDM) Synchronous Optical Network (SONET) signal.
- 1 11. The network element of claim 10, wherein a size of the concatenation can be in
- 2 increments of single SONET frames.
- 1 12. An apparatus comprising:
- a number of ports, each of the number of ports to receive a number of packets
- 3 within a first Time Division Multiplexing (TDM) Synchronous Optical Network
- 4 (SONET) signal having a number of SONET frames, wherein the number of packets is
- 5 concatenated across any of the number of SONET frames within the first TDM SONET
- 6 signal, such that a size of the concatenation can be in increments of single SONET
- 7 frames;

8	a number of buffers coupled to the number of ports, the number of buffers to hold
9	the number of packets received from the number of ports; and
10	a processing element coupled to the number of ports and the number of buffers,
11	the processing element to perform the following:
12	upon determining that the number of packets are being transmitted to a
13	first location that cannot extract the number of packets from any of the number of
14	SONET frames in the first TDM SONET signal, performing the following:
15	extracting the number of packets from the first TDM SONET
16	signal;
17	filling a number of SONET frames in a second TDM SONET
18	signal with transmission data that includes the number of packets, wherein the filling is
19	equally interleaved across the number of SONET frames in the second TDM SONET
20	signal and;
21	transmitting the second TDM SONET signal to the first location;
22	and
23	upon determining that the number of packets are being transmitted to a
24	second location that can extract the number of packets from any of the number of
25	SONET frames in the first TDM SONET signal, transmitting the first TDM SONET
26	signal to the second location.

- 1 13. The apparatus of claim 12, wherein the first location is a network element that is external to a network ring.
- 1 14. The apparatus of claim 12, wherein the second location is a network element that 2 is internal to a network ring.
- 1 15. A network comprising:

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2	a first set of network elements, at least one of the first set of network elements to
3	transmit packet data; and
4	a second set of network elements, the second set of network elements to transmit
5	a Time Division Multiplexing (TDM) Synchronous Optical Network (SONET) signal,
6	the TDM SONET signal having a number of SONET frames, wherein each of the first set
7	of network elements includes:
8	physical connection circuitry having a number of buffers, the number of
9	buffers to hold portions of the packet data received from the at least one of the first set of
10	network elements, the physical connection circuitry to determine packet boundaries for
11	the packet data; and
12	packet processing circuitry coupled to the physical connection circuitry,
13	the packet processing circuitry to receive the packets from the physical connection
14	circuitry and to concatenate the packets into any location with a Time Division
15	Multiplexing (TDM) Synchronous Optical Network (SONET) signal.

- The network of claim 15, wherein the number of packets are concatenated within 1 16.
- locations in the TDM SONET signal not occupied by TDM data traffic. 2
- The network of claim 15, wherein the at least one non-ring network element 17. 1
- includes a router. 2
- The network of claim 15, wherein a communication of packets between the 18. 1
- number of network elements and the at least one non-ring network element is within a 2
- TDM SONET signal such that the number of frames transmitting the number of packets 3
- are concatenated evenly across the TDM SONET signal. 4

- 1 19. A machine-readable medium that provides instructions, which when executed by
- 2 a machine, cause said machine to perform operations comprising:
- 3 receiving packet data;
- 4 concatenating the packet data into a Time Division Multiplexing (TDM)
- 5 Synchronous Optical Network (SONET) signal, wherein the concatenation can be across
- 6 any locations within the TDM SONET signal and wherein a size of the concatenation can
- be in increments of single SONET frames; and
- 8 transmitting the TDM SONET signal having the concatenated packet data.
- 1 20. The machine-readable medium of claim 19, wherein the packet data is
- 2 concatenated within locations in the TDM SONET signal not occupied by TDM data
- 3 traffic.
- 1 21. The machine-readable medium of claim 19, wherein the transmitting of the TDM
- 2 SONET signal is between two network elements in a network ring.
- 1 22. A machine-readable medium that provides instructions, which when executed by
- 2 a machine, cause said machine to perform operations comprising:
- receiving a number of packets within a first Time Division Multiplexing (TDM)
- 4 Synchronous Optical Network (SONET) signal having a number of SONET frames,
- 5 wherein the number of packets are concatenated across any of the number of SONET
- 6 frames within the first TDM SONET signal, such that a size of the concatenation can be
- 7 in increments of single SONET frames;
- g upon determining that the number of packets are being transmitted to a first
- 9 location that cannot extract the number of packets from any of the number of SONET
- 10 frames in the first TDM SONET signal, performing the following:

11	extracting the number of packets from the first 1DW SONET signar,
12	filling a number of SONET frames in a second TDM SONET signal with
13	transmission data that includes the number of packets, wherein the filling is equally
14	interleaved across the number of SONET frames in the second TDM SONET signal and;
15	transmitting the second TDM SONET signal to the first location; and
16	upon determining that the number of packets are being transmitted to a second
17	location that can extract the number of packets from any of the number of SONET
18	frames in the first TDM SONET signal, transmitting the first TDM SONET signal to the
19	second location.

- 1 23. The machine-readable medium of claim 22, wherein the first location is a network element that is external to a network ring.
- 1 24. The machine-readable medium of claim 22, wherein the second location is a network element that is internal to a network ring.
- 25. A machine-readable medium that provides instructions, which when executed by a machine, cause said machine to perform operations comprising:
- 3 receiving packet data;
- 4 placing the packet data into buffers;
- determining packet boundaries among the packet data in the buffers, wherein the
  determining of the packet boundaries locates a number of packets;
- 7 concatenating the number of packets into a Time Division Multiplexing (TDM)
- 8 Synchronous Optical Network (SONET) signal, wherein the concatenation can be across
- 9 any locations within the TDM SONET signal and wherein a size of the concatenation can
- be in increments of single SONET frames; and
- transmitting the TDM SONET signal having the number of concatenated packets.

- 1 26. The machine-readable medium of claim 25, wherein the number of packets are
- 2 concatenated within locations in the TDM SONET signal not occupied by TDM data
- 3 traffic.
- 1 27. The machine-readable medium of claim 25, wherein the transmitting of the TDM
- 2 SONET signal is between two network elements in a network ring.